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SOME ROTATION EXPERIMENTS AT THE OHIO AGRICULTURAL EXPERIMENT STATION, WOOSTER, OHIO

Forty crop rotations and several continuous cropping trials have been under investigation at Wooster since 1915. The crops are corn, oats, wheat, spring wheat, barley, soybeans, potatoes, red clover, sweet clover, alfalfa, and timothy. All crops in each rotation are grown each year.

The average annual application of lime, manure, and fertilizer is the same in each rotation regardless of its length and consists of 2 tons of ground limestone once in 4 years and an average of 2 tons of stable manure and 160 pounds of 20 per cent superphosphate per acre per year. This treatment is not the best for the maximum yield of crops, particularly potatoes, but is such that the effect of the rotation itself is apparent in the yields obtained.

The soil on which these crops were grown is a Canfield silt loam well tile-drained. When properly treated it grows good crops of all kinds. The climate and soil in this section of the State are well adapted to wheat and oats production. Good yields of corn are obtained when the land is well manured and properly fertilized. Liming the land is necessary before good crops of red clover, alfalfa, and sweet clover can be grown.

A few of the more important rotations are reported herein and cover the 11-year period from 1919-1929 inclusive.

In calculating the value of crops the following prices have been used; corn, $0.75; oats, $0.40; wheat, $1.25; soybean seed, $1.50 per bushel; clover hay, $10.00; and alfalfa hay, $13.00 per ton. The prices for the grain crops include the estimated value of the straw and stover.

The 2-year rotations, corn-oats (No. 5) and corn-wheat (No. 6), are greatly improved by sowing sweet clover in the small grain to be plowed under for corn. Occasionally the growth of sweet clover in the fall will be large enough to cut for hay. Removing the hay crop in the fall, however, reduces the value of sweet clover for plowing under the following spring. On land slightly too acid for sweet clover, mammoth red clover may be used.

The two standard 3-year rotations in the State are corn, wheat, clover (No. 11) and corn, oats, clover (No. 12). At

Wooster the yield of corn was four and three-fourths bushels more in No. 12 than in No. 11, probably due to the better clover sod plowed under for corn.

Rotation Experiments at the Ohio Agricultural Experiment Station, Wooster

Rotation number	Crops	Yield and value, 11-year average, 1919-1929		
		Yield per acre	Value of each crop	Average annual value for rotation
5	Corn	68.9 bu.	$51.65	$36.83
	Oats (Sweet Cl.)	55.0 bu.	22.01	
6	Corn	67.4 bu.	$50.53	$44.87
	Wheat (Sweet Cl.)	31.4 bu.	39.20	
14	Corn	80.7 bu.	$60.50	$45.69
	Wheat	39.1 bu.	48.85	
	Alfalfa	4266 lb.	27.73	
11	Corn	74.3 bu.	$55.73	$39.70
	Wheat	36.0 bu.	45.00	
	Red clover	3673 lb.	18.37	
19	Soybean seed	20.7 bu.	$31.07	$31.98
	Wheat	37.3 bu.	46.66	
	Red clover	3644 lb.	18.22	
12	Corn	79.2 bu.	$59.39	$34.56
	Oats	61.5 bu.	24.61	
	Red clover	3934 lb.	19.67	
27	Corn	75.7 bu.	$56.81	$34.22
	Soybean seed	18.8 bu.	28.23	
	Wheat	30.3 bu.	37.88	
	Red clover	2794 lb.	13.97	
21	Corn	72.2 bu.	$54.17	$35.78
	Oats	63.9 bu.	25.56	
	Wheat	37.6 bu.	46.98	
	Red clover	3280 lb.	16.40	
28	Corn	79.4 bu.	$59.55	$37.74
	Oats	61.8 bu.	24.74	
	Red clover	3455 lb.	17.28	
	Wheat (Sweet Cl.)	39.5 bu.	49.38	
23	Corn	78.5 bu.	$58.90	$40.60
	Corn	61.9 bu.	46.40	
	Wheat	31.3 bu.	39.16	
	Red clover	3585 lb.	17.93	
31	Corn	77.1 bu.	$57.81	$34.02
	Oats	59.7 bu.	23.89	
	Wheat	37.2 bu.	46.53	
	Red clover	3723 lb.	18.62	
	Timothy	4653 lb.	23.27	
40	Corn	89.3 bu.	$66.95	$39.28
	Oats	66.8 bu.	26.74	
	Alfalfa	4618 lb.	30.02	
	Alfalfa	5416 lb.	35.20	
	Alfalfa	5771 lb.	37.51	

Better yields of clover hay have followed oats than wheat in this and other rotations in the test. The land is early-spring plowed for oats. Rotation No. 11 has a higher market value than No. 12 because of the higher value of wheat over oats. The live-stock farmer may prefer No. 12.

The rotation, corn, wheat, alfalfa (No. 14), has returned larger yields of grain and hay than No. 11 or No. 12. The alfalfa is cut at least twice and sometimes three times during the season. This rotation indicates that wherever soil conditions are favorable alfalfa may be substituted outright for red clover to advantage. A rotation of corn, oats, and alfalfa would be better for many livestock farmers. The cost of alfalfa seed per acre will be from $0.75 to $2.00 more than red clover, depending upon the variety and grade of seed used. Northern-grown common alfalfa seed will be generally satisfactory for this short rotation. The estimated value of the crops in No. 14 was $6.00 more per year than in No. 11. Where conditions are not uniformly good for alfalfa a mixture of red clover, alsike, and alfalfa may be used, putting in 3 to 5 pounds of alfalfa seed per acre.

In rotation No. 19, soybeans are substituted for corn, making it soybean seed, wheat, clover. The market value of the soybean seed crop was $31.07 and of the corn in No. 11, $55.73. Soybean seed would have to sell for $2.69 per bushel to equal the value of corn for which it was substituted. Better yields of wheat have followed soybeans in this rotation than in other rotations where soybeans are grown for seed.

Wheat has yielded better following soybean hay than soybean seed partly because earlier wheat seeding is possible after hay.

The standard 4-year rotation, corn, oats, wheat, clover (No. 21), may be compared with No. 28 in which the same crops are grown but in different order, corn, oats, clover, wheat with a catch crop of sweet clover in the wheat for corn. In No. 28 the yields of all crops are larger than in No. 21, except oats which are 2 bushels less. One advantage of this rotation is the catch crop of sweet clover for corn. One disadvantage on some farms would be the difficulty of summer plowing a clover sod for wheat.

In rotation No. 23, two crops of corn are followed by wheat and clover, the second crop of corn replacing oats in No. 21. No. 23 has an average annual acre money value of $4.82 more than No. 21 because an acre of corn is worth more than an acre of oats. The second corn crop is smaller than the first. Probably the livestock farmer would substitute oats for wheat in this rotation.

In rotation No. 27, soybeans are substituted for oats, making it corn, soybeans, wheat, clover. The yields of wheat and clover following soybeans are lower than in No. 21.

Rotation No. 31, corn, oats, wheat, clover, timothy, the standard 5-year rotation, may be compared with No. 40, corn, oats,

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